

M.Sc. Mathematics

From the academic year 2023 – 2024

PROGRAMME OUTCOMES(POs)

PO1: Problem Solving Skill: Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.

PO2: Decision Making Skill: Foster analytical and critical thinking abilities for data-based decision-making.

PO3: Ethical Value: Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.

PO4: Communication Skill: Ability to develop communication, managerial and interpersonal skills.

PO5: Individual and Team Leadership Skill: Capability to lead themselves and the team to achieve organizational goals.

PO6: Employability Skill: Inculcate contemporary business practices to enhance employability skills in the competitive environment.

PO7: Entrepreneurial Skill: Equip with skills and competencies to become an entrepreneur.

PO8: Contribution to Society: Succeed in career endeavours and contribute significantly to society.

PO9: Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective.

PO10: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life.

PROGRAMME SPECIFIC OUTCOMES(PSOs)

PSO1: Placement: To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.

PSO2: Entrepreneur: To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skills that will facilitate startups and high potential organizations.

PSO3: Research and Development: Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.

PSO4: Contribution to Business World: To produce employability, ethical and innovative professionals to sustain in the dynamic business world.

PSO5: Contribution to the Society: To contribute to the development of the society by collaborating with stakeholders for mutual benefits.

SEMESTER – I

ALGEBRAIC STRUCTURES

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Recall basic counting principle, define class equations to solve problems, explain Sylow’s theorems and apply the theorem to find number of Sylow subgroups

CLO 2: Define Solvable groups, define direct products, examine the properties of finite abelian

groups, define modules

CLO 3: Define similar Transformations, define invariant subspace, explore the properties of triangular matrix, to find the index of nilpotence to decompose a space into invariant subspaces,

to find invariants of linear transformation, to explore the properties of nilpotent transformation

relating nilpotence with invariants.

CLO 4: Define Jordan, canonical form, Jordan blocks, define rational canonical form, define companion matrix of polynomial, find the elementary devices of transformation, apply the concepts to find characteristic polynomial of linear transformation.

CLO 5: Define trace, define transpose of a matrix, explain the properties of trace and transpose,

to find trace, to find transpose of matrix, to prove Jacobson lemma using the triangular form, define symmetric matrix, skew symmetric matrix, adjoint, to define Hermitian, unitary, normal

transformations and to verify whether the transformation in Hermitian, unitary and normal

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

REAL ANALYSIS - I

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Analyze and evaluate functions of bounded variation and Rectifiable Curves.

CLO2: Describe the concept of Riemann-Stieltjes integral and its properties.

CLO3: Demonstrate the concept of step function, upper function, Lebesgue function and their integrals.

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CLO4: Construct various mathematical proofs using the properties of Lebesgue integrals and establish the Levi monotone convergence theorem.

CLO5: Formulate the concept and properties of inner products, norms and measurable functions.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

ORDINARY DIFFERENTIAL EQUATIONS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Establish the qualitative behaviour of solutions of systems of differential equations .

CLO2: Recognize the physical phenomena modelled by differential equations and dynamical systems.

CLO3: Analyze solutions using appropriate methods and give examples.

CLO4: Formulate Green's function for boundary value problems.

CLO5: Understand and use various theoretical ideas and results that underlie the mathematics in this course.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

GRAPH THEORY AND APPLICATIONS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Demonstrate the concept of different structures and types about graphs and explain its applications.

CLO 2: Determine the properties of trees and applications in network and study the concepts of connections in graphs.

CLO 3: Acquire the knowledge about Euler Tours, Hamilton Cycles and matchings in Graphs.

CLO 4: Analyze the concept of edge colouring, independent sets and cliques in Graphs

CLO 5: Explain the concept of vertex colorings.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	2	2	3	2	2
CLO2	2	3	3	2	3	2	3	3	2
CLO3	2	3	3	2	2	3	3	2	2
CLO4	2	3	3	2	3	3	3	3	3
CLO5	3	3	2	2	2	2	3	3	2

FORMAL LANGUAGES AND AUTOMATA THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Differentiate deterministic and nondeterministic finite automata.

CLO2: Acquire the knowledge of regular sets and its properties.

CLO3: Understand the concept of context free grammars and normal form.

CLO4: Define context free languages and pushdown automata.

CLO5: Explain about context free languages and pushdown automata.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	3	1	3	2	2	3	2	1
CLO2	3	2	1	2	3	2	3	2	1
CLO3	1	3	2	3	2	1	3	2	1
CLO4	2	3	1	2	3	1	3	2	1
CLO5	2	1	3	2	3	1	3	2	1

ALGEBRAIC NUMBER THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Demonstrate competence with the basic ideas of Diophantine and other linear equations

CLO 2: Solve some special equations of the type $x^4+y^4=z^2$

CLO 3: Able to demonstrate infinite continued functions.

CLO 4: Appreciate the significance of approximating irrational numbers.

CLO 5: Acquired the knowledge of Unique factorizations.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	2	3	2	3	2	3	2
CLO2	3	1	2	3	2	2	2	2	2
CLO3	3	1	2	3	1	2	1	2	1
CLO4	3	3	2	3	2	3	2	3	1
CLO5	3	3	2	3	2	3	2	3	3

NUMBER THEORY AND CRYPTOGRAPHY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Explain the concept of congruences and prove related results

CLO 2: Discuss the properties of different arithmetical functions

CLO 3: Derive Euler's summation formula and estimate the average order of different arithmetical functions

CLO 4: Explain simple cryptosystems and encipher matrices

CLO 5: Demonstrate public key cryptography

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	2	3	2	3	2	3	2
CLO2	3	1	2	3	2	2	2	2	2
CLO3	3	1	2	3	1	2	1	2	1
CLO4	3	3	2	3	2	3	2	3	1
CLO5	3	3	2	3	2	3	2	3	3

ANALYTIC NUMBER THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Study the basic concepts of elementary number theory

CLO 2: Explain several arithmetical functions and construct their relationships

CLO 3: Apply algebraic structure in arithmetical functions

CLO 4: Demonstrate various identities satisfied by arithmetical functions

CLO 5: Determine the application to $\mu(n)$ & $\Lambda(n)$ and several equivalent form of prime number theorem

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	2	2	3	2	2
CLO2	3	3	2	2	3	3	3	2	2
CLO3	3	3	2	3	2	2	3	3	2
CLO4	2	2	3	3	3	2	2	2	3
CLO5	3	3	2	2	3	2	2	3	2

FUZZY SETS AND THEIR APPLICATIONS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Understand the definition of Fuzzy sets and its related concepts

CLO2: Define Fuzzy Graphs and can explain the concepts

CLO3: Explain the concepts in Fuzzy sets and its relations

CLO4: Discuss about Fuzzy logic

CLO5: Analyze the compositions of Fuzzy sets.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	2	3	2	3	2	1
CLO2	3	2	1	3	1	2	3	2	1
CLO3	3	2	3	1	2	1	3	2	1
CLO4	2	1	2	3	1	1	3	2	1
CLO5	2	3	1	2	1	1	3	2	1

ADVANCED ALGEBRA

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Prove theorems applying algebraic ways of thinking.

CLO2: Connect groups with graphs and understanding about Hamiltonian graphs.

CLO3: Compose clear and accurate proofs using the concepts of Galois Theory.

CLO4: Bring out insight into Abstract Algebra with focus on axiomatic theories.

CLO5: Demonstrate knowledge and understanding of fundamental concepts including extension fields, Algebraic extensions, Finite fields, Class equations and Sylow's theorem.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

REAL ANALYSIS - II

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Understand and describe the basic concepts of Fourier series and Fourier integrals with respect to the orthogonal system.

CLO2: Analyze the representation and convergence problems of Fourier series.

CLO3: Analyze and evaluate the difference between transforms of various functions.

CLO4: Formulate and evaluate complex contour integrals directly and by the fundamental theorem.

CLO5: Apply the Cauchy integral theorem in its various versions to compute contour integration.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

PARTIAL DIFFERENTIAL EQUATIONS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: To understand and classify second order equations and find general solutions

CLO2: To analyse and solve wave equations in different polar coordinates

CLO3: To solve Vibrating string problem, Heat conduction problem, to identify and solve Laplace and beam equations

CLO4: To apply maximum and minimum principle and solve Dirichlet, Neumann problems for various boundary conditions

CLO5: To apply Green's function and solve Dirichlet, Laplace problems, to apply Helmholtz operation and to solve Higher dimensional problem

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

ALGEBRAIC TOPOLOGY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Give an account of the concepts homotopy, homology and cohomology, their basic properties and relationships

CLO 2: Prove topological results by using algebraic methods

CLO 3: Use the theory to solve elementary topological problems

CLO 4: Compute algebro-topological invariants in specific examples

CLO 5: Explain the fundamental concepts of algebraic topology and their role in modern mathematics and applied contexts.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

MATHEMATICAL STATISTICS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Discuss the sets, functions of sets, random variables and certain expectations

CLO 2: Discuss binomial and related distributions

CLO 3: To study various kinds of distributions

CLO 4: Discuss additional distributions and order statistics and statistical applications

CLO 5: To learn the convergence in distribution of a sequence of random variables

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	3	3	3	3	2
CLO2	3	3	3	3	3	3	3	2	2
CLO3	2	3	2	3	2	3	3	3	3
CLO4	2	3	3	3	2	3	3	3	2
CLO5	2	3	3	3	2	3	3	2	2

TENSOR ANALYSIS AND RELATIVITY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Understand the system of different orders in Tensor Algebra.

CLO2: Explain about Tensor Calculus in Riemann spaces.

CLO3: Understand the concept of Covariant of differentiation and intrinsic differentiation

CLO4: Explain about the theory of relativity and Doppler effect.

CLO5: Analyze about the conservation of mass and energy.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	2	1	2	2	3	2	1
CLO2	2	1	3	1	3	2	3	2	1
CLO3	3	2	1	3	2	1	3	2	1
CLO4	2	3	1	2	3	1	3	2	1
CLO5	3	1	3	2	1	3	3	2	1

WAVELETS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Determine integral wavelet transform, Fourier and inverse Fourier Transformation

CLO2: Explain the concepts of Fourier and Wavelet series and their properties

CLO3: Understand about the spline and interpolation formula

CLO4: Analyze about the multi resolution analysis

CLO5: Determine about computation of cardinal spline Wavelets

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	2	1	2	1	3	2	3	2	1
CLO2	3	1	2	1	3	2	3	2	1
CLO3	3	2	1	3	2	1	3	2	1
CLO4	2	3	1	2	3	1	3	2	1
CLO5	2	1	3	2	3	1	3	2	1

OPERATIONS RESEARCH

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Be able to build and solve Transportation and Assignment problems using appropriate method

CLO 2: Learn the constructions of network and optimal scheduling using CPM and PERT

CLO 3: Ability to construct linear integer programming models and solve linear integer programming models using branch and bound method

CLO 4: Understand the need of inventory management.

CLO 5: To understand basic characteristic features of a queuing system and acquire skills in analyzing queuing models

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	2	2	3	2	2
CLO2	3	3	2	2	3	3	3	2	2
CLO3	3	3	2	3	2	2	3	3	2
CLO4	2	2	3	3	3	2	2	2	3
CLO5	3	3	2	2	3	2	2	3	2

NEURAL NETWORKS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understand and analyze different neuron network models

CLO 2: Understand the basic ideas behind most common learning algorithms for multilayer perceptions, radial basis function networks.

CLO 3: Describe Hebb rule and analyze back propagation algorithms with examples.

CLO 4: Study convergence and generalization and implement common learning algorithms.

CLO 5: Study directional derivatives and necessary conditions for optimality and to evaluate quadratic functions.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	2	2	2	1	2	3	3
CLO2	3	2	2	1	1	1	1	2	2
CLO3	1	2	2	3	1	1	1	2	2
CLO4	2	2	1	1	2	1	1	1	2
CLO5	2	2	2	1	1	1	1	3	2

MATHEMATICAL DOCUMENTATION USING LaTeX

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: To learn the latest techniques in Latex for the preparation of printable documents in an enhanced manner.

CLO 2: To avoid difficulty while typing a project or thesis comparing other mathematical software.

CLO 3: To write mathematical equations and to draw graphs using Latex

CLO 4: To fix footnotes and header

CLO 5: To create tables and type formulae in Mathematics

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	1	3	2	3	1	3	3	2	1
CLO2	3	2	3	1	3	1	3	2	1
CLO3	3	1	2	1	3	2	3	2	1
CLO4	1	3	2	1	3	2	3	2	1
CLO5	3	1	2	3	2	1	3	2	1

SEMESTER – III

COMPLEX ANALYSIS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Analyze and evaluate local properties of analytical functions and definite integrals.

CLO2: Describe the concept of definite integral and harmonic functions.

CLO3: Demonstrate the concept of the general form of Cauchy's theorem

CLO4: Develop Taylor and Laurent series .

CLO5 Explain the infinite products, canonical products and Jensen's formula .

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

PROBABILITY THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: To define Random Events, Random Variables, to describe Probability, to apply Bayes, to define Distribution Function, to find Joint Distribution function, to find Marginal Distribution and Conditional Distribution function, to solve functions on random variables.

CLO2: To define Expectation, Moments and Chebyshev Inequality, to solve Regression of the first and second types.

CLO3: To define Characteristic functions, to define distribution function, to find probability generating functions, to solve problems applying characteristic functions

CLO4: To define One point, two-point, Binomial distributions, to solve problems of Hypergeometric and Poisson distributions, to define Uniform, normal, gamma, Beta distributions, to solve problems on Cauchy and Laplace distributions

CLO5: To discuss Stochastic convergence, Bernoulli law of large numbers, to elaborate Convergence of sequence of distribution functions, to prove Levy-Cramer Theorems and de Moivre-Laplace Theorems, to explain Poisson, Chebyshev, Khintchine Weak law of large numbers, to explain and solve problems on Kolmogorov Inequality and Kolmogorov Strong Law of large numbers.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

TOPOLOGY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Define and illustrate the concept of topological spaces and the basic definitions of open sets, neighbourhood, interior, exterior, closure and their axioms for defining topological space.

CLO2: Understand continuity, compactness, connectedness, homeomorphism and topological properties.

CLO3: Analyze and apply the topological concepts in Functional Analysis.

CLO4: Ability to determine that a given point in a topological space is either a limit point or not for a given subset of a topological space.

CLO5: Develop qualitative tools to characterize connectedness, compactness, second countable, Hausdorff and develop tools to identify when two are equivalent(homeomorphic).

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

MECHANICS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Demonstrate the knowledge of core principles in mechanics.

CLO2: Interpret and consider complex problems of classical dynamics in a systematic way.

CLO3: Apply the variation principle for real physical situations.

CLO4: Explore different applications of these concepts in the mechanical and electromagnetic fields.

CLO5: Describe and apply the concept of Angular momentum, Kinetic energy and Moment of inertia of a particle

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

PROGRAMMING IN C++

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understanding about object oriented programming. Learn how to store one object inside another object

CLO 2: Gain knowledge about the capability to store information together in an object.

CLO 3: Understand the capability of a class to rely upon another class. Learn use of one method can be used in variety of different ways

CLO 4: Understanding the process of exposing the essential data to the outside of the world and hiding the low level data .Create and process data in files using file I/O functions

CLO 5: Understand about constructors which are special type of functions. Discuss to know about writing style

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	3	3	3	3	2	1
CLO2	2	1	2	2	3	3	3	2	1
CLO3	1	3	3	3	3	3	3	2	1
CLO4	2	1	2	2	3	3	3	2	1
CLO5	1	2	1	1	3	3	3	2	1

MATHEMATICAL PYTHON – THEORY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Give mathematical model for real world problems

CLO 2: Design algorithms for mathematical models, analyse the efficiency and correctness of algorithms.

CLO 3: Design implementable programs in Python.

CLO 4: Define and demonstrate the use of functions and looping using Python.

CLO 5:Design and implement a program to solve a real-world problem.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	2	3	3	3	3
CLO2	3	2	3	3	2	3	3	3	3
CLO3	3	2	3	3	3	3	3	3	3
CLO4	3	2	3	3	3	3	3	3	3
CLO5	2	2	2	3	3	3	3	3	3

STOCHASTIC PROCESS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Define Markov chain and Transition probability matrix.

CLO 2: Understand the concepts of queuing models and limit theorems on Markov chains.

CLO 3: Explain about the pure birth , death processes and Poisson process.

CLO 4: Acquire the knowledge of some special Renewal processes.

CLO 5: Describe the joint probabilities for Brownian motion.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	2	3	2	3	2	1
CLO2	2	1	2	1	3	2	3	2	1
CLO3	3	2	1	3	2	1	3	2	1
CLO4	2	1	1	2	3	2	3	2	1
CLO5	3	1	2	3	2	1	3	2	1

SEMESTER – IV

FUNCTIONAL ANALYSIS

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Understand the Banach spaces and Transformations on Banach Spaces.

CLO2: Prove Hahn Banach theorem and open mapping theorem.

CLO3: Describe operators and fundamental theorems.

CLO4: Validate orthogonal and orthonormal sets.

CLO5: Analyze and establish the regular and singular elements.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

DIFFERENTIAL GEOMETRY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Explain space curves, Curves between surfaces, metrics on a surface, fundamental form of a surface and Geodesics.

CLO2: Evaluate these concepts with related examples.

CLO3: Compose problems on geodesics.

CLO4: Recognize applicability of developable.

CLO5: Construct and analyze the problems on curvature and minimal surfaces

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	1	3	2	3	3	3	2	1
CLO2	2	1	3	1	3	3	3	2	1
CLO3	3	2	3	1	3	3	3	2	1
CLO4	1	2	3	2	3	3	3	2	1
CLO5	3	1	2	3	3	3	3	2	1

PROGRAMMING IN C++ PRACTICAL

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Understanding about object oriented programming. Learn how to store one object inside another object

CLO 2: Gain knowledge about the capability to store information together in an object.

CLO 3: Understand the capability of a class to rely upon another class. Learn use of one method can be used in variety of different ways

CLO 4: Understanding the process of exposing the essential data to the outside of the world and hiding the low level data .Create and process data in files using file I/O functions

CLO 5: Understand about constructors which are special type of functions. Discuss to knowabout writing style

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	1	3	3	3	3	2	1
CLO2	2	1	2	2	3	3	3	2	1
CLO3	1	3	3	3	3	3	3	2	1
CLO4	2	1	2	2	3	3	3	2	1
CLO5	1	2	1	1	3	3	3	2	1

MATHEMATICAL PYTHON – PRACTICAL

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Write programs using advanced concepts of Python.

CLO 2: Write, Test and Debug Python Programs.

CLO 3: Implement Conditionals and Loops for Python Programs.

CLO 4: Use functions and represent Compound data using Lists, Tuples and Dictionaries.

CLO 5: Read, write and manipulate data from & to files in Python.

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	2	3	3	2	3	3	3	3
CLO2	3	2	3	3	2	3	3	3	3
CLO3	3	2	3	3	3	3	3	3	3
CLO4	3	2	3	3	3	3	3	3	3
CLO5	2	2	2	3	3	3	3	3	3

RESEARCH METHODOLOGY

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO1: Discuss to know about writing style

CLO2: Discuss the Tips and Strategies

CLO3: To know about the research project

CLO4: Discuss the different components of Research Project

CLO5: To learn the Publication and presentation of research articles and Tool kits

	POs						PSOs		
	1	2	3	4	5	6	1	2	3
CLO1	3	3	2	3	3	3	3	2	3
CLO2	3	3	3	3	3	3	2	2	3
CLO3	2	3	2	3	2	3	3	3	3
CLO4	2	3	3	2	3	3	3	2	3
CLO5	2	3	3	3	2	3	3	2	2